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PATENT AND TECHNICAL TRANSLATION

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DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of PCT/EP2005/050265, filed 01/21/2005, and published on 11/08/2005 under No. WO 2005/072967 A1, and of twenty (20) amended claims.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Olaf Bexhoeft

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Specification

Methods for the Compensation of a Transverse Elongation and/or a Longitudinal Elongation of a Printing Material, and Printing Press with Several Printing Couples Generating at Least One Printed Image on a Printing Material

The invention relates to methods for compensating a transverse elongation and/or a longitudinal elongation of a material to be imprinted and a printing press with several printing groups which create at least one print image on a material to be imprinted.

A method and a device for adapting the position of printing plates to a deformation of a paper web to be imprinted by means of printing rollers is known from DE 195 16 368 A1, wherein the printing plate, or the holder receiving it in a punching and/or bending machine, is respectively displaced or offset in the lateral direction, circumferential direction and/or its angular position by those amounts which the printing plate requires on its printing roller because of the deformation of the paper web, in order to provide an imprint corresponding with a previous printing roller in the feeding direction of the paper web in spite of the deformation of the paper web which had taken place in the meantime, and wherein bending and/or punching is performed on this printing plate displaced from its zero position, for which purpose a computer-controlled alignment device in the punching and/or bending machine is employed after the respective data regarding the paper web, the printing press and the production type have been entered in the computer. In this case the deformation of the paper web, also known by the term "fan-out", is caused by

moisture, ink absorption and mechanical stresses in the course of the passage through several pairs of printing rollers arranged one behind the other.

Image regulation systems for counteracting the "fan-out effect" are known from DE 295 01 373 U1, DE 42 24 235 C2, DE 43, 47 846 A1 or EP 0 938 414 B2, wherein the image regulators operate mechanically or pneumatically, for example.

The object of the invention is based on creating methods for compensating a transverse elongation and/or a longitudinal elongation of a material to be imprinted and a printing press with several printing groups which create at least one print image on a material to be imprinted

In accordance with the invention, this object is attained by means of the characteristics of claims 1, 3 or 5.

The advantages to be attained with the invention lie in particular in that a transverse elongation of the material to be imprinted in particular is very extensively compensated. This occurs on the one hand in that an image regulator, which is controlled by a control unit, reduces the material to be imprinted in its width in a manner counteracting the transverse elongation. Preferably, the control unit takes further factors which affect the transverse elongation into consideration and controls the actuation of further installations, in particular in or at the cylinders, for counteracting the results of the "fan-out effect". Moreover, at the time of applying the image it is advantageous to compensate a known portion of the transverse elongation and/or the longitudinal elongation of the material to be imprinted by at least one printing forme, which is to be arranged on a downstream-located printing group, by means of the design and/or positioning of a print image location on the printing forme. By means of this

it is already possible to compensate systematic deviations, in particular between printing groups following each other, to a large extent. The proposed solution relieves the operators of the printing press of time-consuming checks of the correct position of the printing forme containing the print image location and of an alignment of the position of the printing forme on the forme cylinder. This advantage becomes all the greater the more printing formes are involved in the printing process. In a printing press which, for example, employs four printing colors for imprinting, for example a newspaper printing press with, for example, respectively twelve printing formes on each forme cylinder, a considerable advantage results by means of the controlled matching of the print image locations to the print image, because otherwise the position of a total of forty-eight printing formes would have to be checked and aligned for fan-out compensation on the four forme cylinders. In case of a simultaneous recto and verso printing process, twice the number of printing formes, namely ninety-six, have to be aligned with each other in the mentioned example, because of which an outlay for checking the position of the printing formes, as well as for their alignment with each other, is created, which can no longer be efficiently managed.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a schematic representation of a printing press suitable for multi-color printing, having four printing units, each with two printing groups,

Fig. 2, a schematic representation of four forme cylinders arranged downstream of each other and with printing formes with print image locations,

Fig. 3, a printing group with print images created on a material to be imprinted,

Fig. 4, a holding device arranged in a channel of a forme cylinder.

In a greatly simplified form, Fig. 1 schematically shows a printing press 01, preferably a printing press 01 which imprints in several different colors, for example a printing press 01 for newspapers, having four printing units 02 arranged vertically on top of each other, for example, in which a material 03 to be imprinted, for example a web 03 of material, in particular a paper web 03, successively passes vertically through the printing units 02. A production flow P of the material 03 to be imprinted passing through the printing press 01 is assumed to substantially move from the bottom to the top.

In the example represented in Fig. 1, a respective printing group 04 with a cylinder 06 for transferring ink and a forme cylinder 07 (cylinder 07), which rolls off on the cylinder 06 transferring the ink, is arranged on both sides of the paper web 03 in each printing unit 02 for recto and verso printing. The representation of an inking system, a dampening system and further components which are part of the printing group 04, for example, has been omitted here, since they are not necessary for explaining the invention. The cylinders 06 transferring ink are preferably embodied as transfer cylinders 06 operating by means of the offset printing method, wherein the transfer cylinders 06 preferably have an elastic surface, wherein the elastic surface is constituted, for example, by respectively at least one printing blanket made of

an elastomeric material arranged on the shell face of the transfer cylinder 06.

In the exemplary representation of Fig. 1, the transfer cylinders 06, which are arranged on both sides of the paper web 03 in each printing unit 02, have been placed against each other in a so-called rubber-to-rubber arrangement, so that the transfer cylinders 06 arranged in the same printing unit 02 alternatingly function as a counter-pressure cylinder. Alternatively, two adjoining printing units 02 can be combined into a satellite printing unit, wherein the printing groups 04 of these printing units 02 are arranged around a common counter-pressure cylinder, which is separate from the remaining cylinders 06, 07, wherein the paper web 03 is respectively conducted between the counter-pressure cylinder and at least one transfer cylinder 06 placed against the counter-pressure cylinder.

A further alternative for the design of the printing press 01 can provide for the printing press 01 to be designed as a job-printing press 01, preferably with a substantially horizontal guidance of the material 03 to be imprinted, wherein several successive printing groups 04 are provided in the printing press 01 along the production flow P of the material 03 to be imprinted, preferably on both sides, i.e. underneath and on top of the material 03 to be imprinted, wherein the transfer cylinders 06 of two printing groups 04 arranged in a printing unit 02 are again placed against each other in a rubber-to-rubber arrangement, wherein the material 03 to be imprinted is conducted between the two transfer cylinders 06 placed against each other, so that the material 03 to be imprinted passes through the area in which they roll off on each other.

The forme cylinders 07 assigned to the transfer cylinders 07 each have at least one printing forme 08 (Fig. 2) on their shell faces. In their axial direction X and/or in their circumferential direction Y, the forme cylinders 07 are preferably covered by several printing formes 08. For example, in a newspaper printing press 01 the forme cylinders 07 are each covered in their axial direction X with six printing formes 08, and in their circumferential direction Y with two printing formes 08, so that then twelve printing formes 08 are arranged on each forme cylinder 07. A developed view of such forme cylinders 07, each with twelve printing formes 08, is represented schematically in Fig. 2, wherein the directional arrows X, Y, which are part of Fig. 2 and extend at right angles to each other, show the axial direction X in respect to the forme cylinder 07 and the circumferential direction Y of the forme cylinder 07.

For generating a print image 11 (Fig. 3) on the material 03 to be imprinted, each printing forme 08 has at least one print image location 09 (Fig. 2). It can be alternatively provided that the printing formes 08 have several print image locations 09 in the axial direction X in respect to the forme cylinder 07 and/or the circumferential direction Y of the forme cylinder 07. By way of example, Fig. 3 shows the generation of six print images 11 on the material 03 to be imprinted in the axial direction X in respect to the forme cylinder 07. The production flow P of the material 03 to be imprinted, as well as a production direction R of the forme cylinder 07 and of the transfer cylinder 06 working together with the latter, are indicated. Instead of providing, for example, six printing formes 08 in the axial direction on a forme cylinder 07, and in its circumferential direction Y for example two printing formes 08, the forme cylinders 07 can for

example each be covered by only one printing forme 08, wherein this printing forme 08 has, for example, six print image locations 09 in the axial direction X in respect to the forme cylinder 07 and/or in the circumferential direction Y of the forme cylinder 07 two print image locations 09, for example. Also, every printing forme 07 can have only a single print image location 09.

The printing groups 04 arranged one behind the other on the same side of the material 03 to be imprinted in its production flow P preferably print ink of colors different from each other. For example, ink dots of the colors black, cyan, magenta and yellow, which are customary in four-color printing, are printed in four successive printing groups 04, namely color dots of one of these colors in each one of these printing groups 04. Print image locations which correlate with the same print image 11 are located on the forme cylinder 07 of the successive printing groups 04, each of which constitutes a color separation of the multi-color print image to be created, wherein each color separation is assigned to one of the color tones to be printed. A multi-color print image 11 is created in that several color separations, for example the four color separations which respectively correspond to the four colors black, cyan, magenta and yellow, are printed on top of each other onto the material 03 to be imprinted, wherein the color dots of the individual color separations relating to the same print image 11 are arranged next to each other or on top of each other on the material 03 to be imprinted, so that the multi-color print image 11 is created by a color mixture of the color dots resulting from the different color separations.

Each print image location 09 has a width B in the axial direction X in respect to the forme cylinder 07 and a length L in the circumferential direction Y of the forme cylinder 07. Print

image locations 09 constituting a color separation for creating a common print image 11 must be printed so that they fit exactly on top of each other by the printing groups 04 which are arranged following each other in the production flow P of the material 03 to be imprinted, by means of their respective cylinders 06 which transfer ink from the forme cylinder 07. Adhering to this requirement which is necessary for a good printing result is made difficult since the material 03 to be imprinted customarily has a longitudinal elongation along the production flow P, and/or a transverse elongation crosswise to the production flow P on its way from one ink-transferring cylinder 06 to an ink-transferring cylinder 06 which follows in the production flow P. The longitudinal elongation and/or the transverse elongation of the material 03 to be imprinted result, for example, from the material 03 to be imprinted absorbing moisture transported by the dampening system of the printing press 01, and/or moisture from the ink, and/or moisture from the air surrounding the material 03 to be imprinted, and/or from a mechanical elongation of the material 03 to be imprinted when passing through several successively arranged printing groups 04. Such a longitudinal elongation and/or transverse elongation of the material 03 to be imprinted is known by the term "fan-out".

If, in connection with a printing press 01, the distances A1, A2, A3 (Fig. 1) between their ink-transferring cylinders 06 and are arranged one behind the other in the production flow P, and a mechanical elongation of the material 03 to be imprinted possibly occurring between these cylinders 06, as well as the moisture-caused elongation of the material 03 to be imprinted, which has been determined, for example, in accordance with DIN

53130, are known, it is suggested to determine what changes in the length L and/or the width B of the print image locations 09, which create a common print image 11 and are located in different printing groups 04, are to be expected. Therefore a defined dimensional change is to be expected for each print image location 09 as a function of its position on the forme cylinder 07 and of the intensity of the above mentioned influencing values in comparison with another print image location 09 arranged on another forme cylinder 07 at the same position, wherein the dimensional change indicates that the length L of two print image locations 09 following each other in the production flow P of the material 03 to be imprinted differs by a factor FL, and/or the width B of two print image locations 09 following each other in the production flow P of the material 03 to be imprinted differs by a factor FB. In this case the factors FL, FB can express a relative dimensional change, for example in percent, in respect to an original length L or width B, or an absolute dimensional change, for example in the form of an amount of change based on an original length L or width B.

Delimited by its length L and width B, each print image location 09 defines an area (Fig. 2), wherein the area of a print image location 09 arranged on a forme cylinder 07 is arched, and its curvature is matched to the course of the shell face of the forme cylinder 07 in its circumferential direction Y. At the intersection of its diagonal lines (represented in dashed lines in Fig. 2), the area has a center point S. Alternatively or in addition to the dimensional change of a print image location 09, a position (X1, Y1) of the center point S of this print image location 09 can also differ in comparison with a position (X2, Y2)

of a print image location 09, which is correlated with the common print image 11, on a forme cylinder 07 which follows in the production flow P of the material 03 to be imprinted, wherein these print image locations 09 are preferably each arranged on a printing forme 08, wherein the printing formes 08 with the print image locations 09 which differ in the position (X1, Y1), (X2, Y2) of their center points S, are arranged in the same position on the respective forme cylinders 07. Thus, the printing formes 08 with the print image locations 09 remain fixed in place on their respective forme cylinders 07, while only the position (X1, Y1), (X2, Y2) of at least one of the center points S of two print image locations 09 following each other in the production flow P of the material 03 to be imprinted is displaced, so that only the positions (X1, Y1), (X2, Y2) of the center points S of these print image locations 09 are changed in relation to each other by a distance W (Fig. 2), without changing the position of a printing forme 08 on its respective forme cylinder 07. The distance W is located in the same plane as the area defined by the length L and width B of the print image location 09, and can show the displacement of the center point S in this plane in any arbitrary direction in comparison with the position (X1, X2) of the center point S of the related print image location 09.

Since the longitudinal elongation and/or the transverse elongation of the material 03 to be imprinted can have different effects depending on the position of a printing forme 08 on the forme cylinder 07, the length L of two print image locations 09 arranged side-by-side on the same forme cylinder 07 in its axial direction X can differ from each other by a factor FL, and/or the width B of two print image locations 09 arranged side-by-side on the same forme cylinder 07 in its axial direction X by a factor

FB. In this case, the same as in the previously described dimensional change, the factor FL relating to the length L of the print image location 09 is a function of a factor DL of the longitudinal elongation, and the factor FB relating to the width B of the print image location 09 is a function of a factor DQ of the transverse elongation, wherein the factor DL of the longitudinal elongation and the factor DQ of the transverse elongation take into consideration, for example, the distances A1, A2, A3 between the ink-transferring cylinders 06 of the printing press 01 and are arranged following each other in the production flow P, as well as the mechanical elongation of the material 03 to be imprinted possibly occurring between these cylinders 06, as well as the moisture-caused elongation of the material 03 to be imprinted. In the course of this, the length L of the print image location 09 is preferably increased by the factor DL of the longitudinal elongation, and the width B of the print image location 09 by the factor DQ of the transverse elongation. The factor DL of the longitudinal elongation and the factor DQ of the transverse elongation can be changeable, wherein the change can be related to further parameters, in particular parameters relating to operating conditions of the printing press 01 and properties of the material 03 to be imprinted, for example the production speed of the printing press 01 or the temperature of the air surrounding the material 03 to be imprinted, and in particular the moisture content of this air.

Furthermore, the factor DL of the longitudinal elongation and/or the factor DQ of the transverse elongation can take into consideration that, for example the transverse elongation in respect to the print image locations 09 which are "on the outside" in respect to the front of the forme cylinder 07 has a greater

effect than on "inner" print image locations 09 arranged close to the center of the forme cylinder 07, provided a center line M, which for example halves the cylinder length, serves as a reference, or a reference marker M for the transverse elongation (Fig. 2). Also, the factor FL, which differentiates the length L of two print image locations 09 following each other in the production flow P of the material 03 to be imprinted, and/or the factor FB, which differentiates the width B of two print image locations 09 following each other in the production flow P of the material 03 to be imprinted, can depend on the arrangement of that printing group 04 in the production flow P of the material to be imprinted, in which the forme cylinder 07 with the printing form 08 having the print image location 09 whose length L and/or width B changed by the factor LB, FB is located, because there is an effect on the value of the factors FL, FB whether the print image locations 09 of printing groups 04, which directly follow each other, or those of printing groups 04 lying farther apart, are being compared to each other.

In the same way it can be provided that the position (X1, Y1) of the center point S of a print image location 09 differs in comparison with the position (X2, Y2) of the center point S of a another print image location 09 arranged on the same forme cylinder 07 in the axial direction X of the latter, wherein these print image locations 09 being compared have the same length L and width B, wherein the print image locations 09 arranged side-by-side on the same forme cylinder 07 are each arranged on one printing forme 08, wherein the printing formes 08 which are arranged on the same forme cylinder 07 and have print image locations 09 whose position (X1, Y1), (X2, Y2) of their center points S differ, have been placed in alignment with each other in

the axial direction X of the respective forme cylinder 07. Even in the case of the displacement of the position (X1, Y1), (X2, Y2) of the center point S of print image locations 09, which are different, but create a common print image 11, the distance W of the displacement can be a function of the factor DL of the longitudinal elongation and of the factor DQ of the transverse elongation, regardless of the arrangement of the print image locations 09 on the same, or on forme cylinders 07 which follow each other in sequence in the production flow P.

A channel 13 extending in the axial direction X underneath the shell face 12 with a preferably slit-shaped opening 14 for holding one or several printing formes 08 on the shell face 12 of a forme cylinder 07 is for example provided - as can be seen in Fig. 4 -, wherein legs 18, 19, which are beveled off the ends 16, 17 of the printing forme(s) 08, are placed against walls 23, 24, which extend from edges 21, 22 on the shell face 12 of the opening 14 toward the interior of the channel 13, wherein one of the legs 18 has been hooked by means of the end 16, which leads in the production direction R of the printing forme(s) 08, on the wall 23 in relation to an imaginary tangential line T resting on the opening 14 at a preferably acute opening angle α in respect to the channel 13, and the other leg 19 at the end 17 of the printing forme(s) 08 which trails in the production direction P of the forme cylinder 07 is held with an end 28 which is oriented toward the opening 14 by means of preferably strip-like embodied holding means 27 against a wall 24 which, in relation to a tangential line T resting on the opening 14 at a preferably approximately right-angled opening angle β in respect to the channel 13, wherein an end 28 of the holding means 27 facing away from the opening 14 is pivotably seated, for example in a groove 29, on or close to the

bottom of the channel 13. An actuating means 32, for example a pneumatically actuable actuating means 32, in particular a hollow body 32 which can be charged with a pressure medium, for example compressed air, and is reversibly elastically deformable, preferably a hose 32, which is arranged in the channel 13 and for example is supported on a counter-thrust element 31 arranged in the channel 13, if actuated pivots the at least one holding means 27 against the force of at least one spring element 33, also preferably arranged in the channel 13, wherein the at least one spring element 33 performs a controlled lift, for example by means of a guide element 34 assigned to it, substantially directed in the circumferential direction Y of the forme cylinder 07. The guide element 34 can be arranged on a support element 37, which itself is supported on a wall 36 of the channel 13. The opening 14 has a slit width V of preferably less than 5 mm at the shell face 12 of the forme cylinder 07, wherein the slit width V lies between 1 mm and 3 mm in particular. In the example represented, the holding means 27, the actuating means 32 and the spring element 33 constitute essential elements of a holding device for holding one or several printing forms 08 on the shell face 12 of a forme cylinder 07.

It is also possible, for example, to provide at least one register pin (not represented) in at least one forme cylinder 07, wherein the register pin aligns at least one printing form 08 arranged on the forme cylinder 07 in an axial direction X in regard to the forme cylinder 07. The holding device, or the register pin, is designed for working together with at least one printing forme 08 and can be shifted in the channel 13 in the axial direction X of the forme cylinder 07, for example as a function of the factor DQ of the transverse elongation, preferably

at a ratio proportional to the behavior of the factor DQ of the transverse elongation. For performing the shifting of the printing forme 08, which is directed in the axial direction X of the forme cylinder 07 in particular, preferably at least one controllable actuator (not represented) is arranged in the forme cylinder 07, for example in its channel 13, wherein the actor shifts the holding device or the register pin. The actuator can be designed as a piezo element or a linear motor, for example. It can be provided that at least one holding device or at least one register pin is assigned to the printing forme 08 on each forme cylinder 07. It is advantageous if each printing forme 08 can be individually shifted in the axial direction X in respect to the forme cylinder 07.

Alternatively or additionally to the displacement of one or several printing formes 08 on a forme cylinder 07, it is possible to provide that the entire forme cylinder 07 can be shifted in its axial direction X, so that all printing formes 08 arranged on it are identically shifted. When shifting one or several printing formes 08 on the forme cylinder 07, as well as when axially displacing the entire forme cylinder 07, shifting takes place transversely in respect to the production flow P of the material 03 to be imprinted and relative to the material 03 to be imprinted, i.e. relative to a reference marker M of the material 03 to be imprinted, wherein the reference marker M can for example be the center line M of the material 03 to be imprinted (Fig. 2). However, the reference marker M can also be located at a different spot on the material 03 to be imprinted, for example at one of its lateral edges. The displacement of the printing formes 08 oriented transversely in respect to the production flow P of the material 03 to be imprinted can also be related to a stationary

frame of the printing press 01 instead of to the material 03 to be imprinted.

The forme cylinder 07 and/or the cylinder 06 which transfers ink of at least one of the two printing groups 04 arranged one behind the other is preferably driven by a controllable drive mechanism (not represented), for example by an electric motor, in particular a frequency-controlled motor. However, it can also be provided that each one of the forme cylinders 07 and/or the ink-transferring cylinders 06 of all printing groups 04 arranged one behind the other is individually driven. When using controllable drive mechanisms, a phase relation assumed in respect to each other of the forme cylinders 07 and/or of the ink-transferring cylinders 06 of at least two printing groups 04 can preferably be controlled as a function of the factor DL of the longitudinal extension. By means of the controllable phase relation of the forme cylinders 07 and/or of the ink-transferring cylinders 06 it is possible in particular to affect a circumferential register of the forme cylinders 07.

The actuator, and/or the phase relation of the forme cylinders 07 and/or of the ink-transferring cylinders 06, are preferably continuously controllable. The actuator, and/or the phase relation of the forme cylinders 07 and/or of the ink-transferring cylinders 06, are preferably controllable in the running production flow P of the material 03 to be imprinted, in particular the actuator, and/or the phase relation of the forme cylinders 07 and/or of the ink-transferring cylinders 06, are controllable, for example, from a control console assigned to the printing press 01 or from another central control unit, i.e. they can be remotely controlled.

It is advantageous to provide a memory unit connected with the control unit for at least one of the printing groups 04, wherein the memory unit contains at least one value for the factor FL of the length L of two print image locations 09 which are located behind each other in the production flow P of the material 03 to be imprinted and/or at least one value for the factor FB of the width B of two print image locations 09 which are located behind each other in the production flow P of the material 03 to be imprinted. Alternatively or additionally the memory unit can respectively contain at least one value for the factor FL of the length L of two print image locations 09 which are located side-by-side on the same forme cylinder 07 and/or at least one value for the factor FB of the width B of two print image locations 09 which are located side-by-side on the same forme cylinder 07. Furthermore, the memory unit can contain at least one value for the different positions (X1, Y1), (X2, Y2) of the center point S of two print image locations 09 which are located side-by-side on the same forme cylinder 07.

It can be provided that the control unit tracks the center point S of at least one print image location 09, which follows a different print image location 09 in the production flow P of the material 03 to be imprinted, in respect to the center point SB of the print image 11 to be imprinted, which was displaced during a running printing process, for example by the longitudinal elongation and/or the transverse elongation of the material 03 to be imprinted (Fig. 3). In the process, the control unit controls at least the actuator and/or the phase relation of the forme cylinder 07 and/or the ink-transferring cylinders 06, preferably as a function of the value for the factor FL and/or the factor FB and/or the positions (X1, Y1), (X2, Y2) of the center point S

stored in the memory unit. For example, the center point S of the print image 11 to be imprinted is detected by means of a detector unit connected with the control unit, for example a device which optically detects and digitally evaluates the print image 11, for example a semiconductor camera with a CCD sensor. For example, the control unit operates devices which are connected with it to the effect that the center point S of the print image locations 09 which print a common print image 11 is brought into agreement with the center point SB of the print image 11 to be imprinted.

Methods for compensating the longitudinal elongation and/or the transverse elongation here proposed provide, and this preferably in advance of a shifting of at least one printing forme 08 on a forme cylinder 07, wherein the shifting takes place in relation to a reference marker M on the material 03 to be imprinted, that the length L of at least one print image location 09 of a printing forme 08, compared with the length L of a print image location 09, which correlates with the same print image 11, of a different printing forme 08 arranged on another forme cylinder 07, is changed by the factor FL, and/or the width B of at least one print image location 09 of a printing forme 08, compared with the width B of a print image location 09 correlating with the same print image 11 of another printing forme 08 arranged on another forme cylinder 07, is changed by the factor FB. Alternatively or additionally the position (X1, Y1) of a center point S of at least one print image location 09 of a printing forme 08, compared with the position (X2, Y2) of the center point S of a print image location 09 correlating with the same print image 11 of another printing forme 08 arranged on another forme cylinder 07 at the same position of the forme cylinder 07, is changed. In the process, the length L and/or the width B and/or

the position (X1, Y1), (X2, Y2) of the center point S of the print image location 09 is preferably changed by using the factor DL of the longitudinal elongation and/or the factor DQ of the transverse elongation. Also, a change of the length L and/or the width B and/or the position (X1, Y1), (X2, Y2) of the center point S of the print image location 09 is preferably performed as a function of the position of the printing forme 08 on the forme cylinder 07, namely that forme cylinder 07, on which the printing forme 08 with the changed print image location 09 is arranged.

A value for the factor FL, which changes the length L, is preferably determined as a function of the factor DL of the longitudinal elongation, and a value for the factor FB, which changes the width B, is preferably determined as a function of the factor DQ of the transverse elongation. The value for the factor FL, which changes the length L, and/or the value for the factor FB, which changes the width B, and/or the coordinates for a new position of the (X1, Y1), (X2, Y2) of the center point S of the print image location 09 on the printing forme 08 on one of the forme cylinders 07 can also be determined as a function of the print image location 09 of a different printing forme 08 arranged in the same position on the forme cylinder 07 on a different forme cylinder 07.

A change of the position L and/or the width B of a print image location 09, or a change of the position (X1, Y1), (X2, Y2) of its center point S for compensating a portion of the longitudinal elongation and/or the transverse elongation known at the time the image was applied to the printing forme 08 is preferably performed in that a printing forme 08 with a print image location 09 which was changed in its above mentioned parameters is arranged on a forme cylinder 07 in the same position

of a forme cylinder 07 having a printing forme 08 with a print image location 09 which is to be changed. In this way at least a part of the compensation of the "fan-out effect" takes place in connection with the provision of an image on the printing forme 08, i.e. in the course of creating the print image location 09. A print image location 09 which, in comparison with the print image location 09 of another printing forme 08, has already been changed in regard to its dimensions, and/or the position (X1, Y1), (X2, Y2) of its center point S, is arranged at the position on a forme cylinder 07 intended for it. In this case the change is performed to the extent the change of the dimension and/or of the position (X1, Y1), (X2, Y2) of its center point S of the print image location 09 is to be expected, for example as a function of the factor DL of the longitudinal elongation, and/or the factor DQ of the transverse elongation of the material 03 to be imprinted, and/or the position of the print image location 09 on one of the forme cylinders 07, as well as possibly further previously known or determinable parameters. Thus the change relates to a change of the dimension and/or position of the print image location 09 on a printing forme 08, so that systematic deviations to be expected between at least two print image locations 09 are compensated. Because of this a change of the position of the printing forme 08 on the forme cylinder 09 often is no longer required, or only for fine adjustment or updating in the course of the ongoing printing process.

To begin with, known or determinable parameters for taking into consideration the required change of the dimension and/or position of the print image location 09 on a printing forme 08, for example the factor DL of the longitudinal elongation, and/or the factor DQ of the transverse elongation of the material 03 to

be imprinted, are supplied to an image application system wherein the image application system applies the print image location 09, for example by means of a laser, to the printing forme 08, preferably controlled by means of a computer and on the basis of a digital data set. Therefore the image application system creates the print image location 09 on a printing forme 08 in accordance with the predetermined conditions and in this way compensates the results of the "fan-out effect" to be expected. In the process, the image application system applies the images to the printing forme 08 in particular as a function of the color tone of the cylinder 06 transferring the ink, and/or of the arrangement of the printing group 04 in respect to the forme cylinder 07 carrying the printing forme 08 in the production flow P of the material 03 to be imprinted, and/or the position of the printing forme 08 arranged on the forme cylinder 07. Thus, in the course of creating a print image location 09, the image application system takes into consideration its position on the forme cylinder 08, wherein this position is customarily determined by means of an occupation plan created in a pre-printing stage. Based on the position of the printing forme 08 in accordance with the occupation plan on one of the forme cylinders 07, the image application system then matches at least some print image locations 09, preferably each print image location 09 in a further printing group 04 following a first printing group 04, in its length L, and/or width B, and/or in the position of its center point S, as a function of the mentioned influencing values which were taken into consideration during the creation of the same print image 11, in order to counteract systematic deviations to be expected in the course of the ongoing printing process and to compensate for them as much as possible by a suitable design

and/or arrangement, i.e. positioning, of the print image location 09.

In a further development of the proposed method, a desired value of the factor FL changing the length L, and/or a desired value of the factor FB changing the width B, and/or a desired value of the position of the center point S of a print image location 09 of a printing forme 08 to be changed, are continuously determined in that parameters, which are relevant to the mentioned changes, are detected and their values are matched in the course of the ongoing printing process. It is then possible to arrange a printing forme 08 containing the changed print image location 09 on at least one forme cylinder 07 if an actual value of the factor FL changing the length L, and/or a actual value of the factor FB changing the width B, and/or an actual value of the position (X1, Y1), (X2, Y2) of the center point S of the print image location 09 of a printing forme 08 exceeds a permissible deviation from the determined desired values. However, to this end the creation of a printing forme 08 with a changed print image location 09 and its exchange on the forme cylinder 07 involved is required, which can mean an interruption of the printing process.

For example, the desired values are determined for each color tone which is transferred by an ink-transferring cylinder 06. Or, the desired values are determined for each forme cylinder 07 of the printing groups 04 following each other in the production flow P of the material 03 to be imprinted, and/or for each position of a printing forme 08 arranged on one of the forme cylinders 07. The determined desired values are preferably stored in a memory and are made available to the image application system as required.

It is furthermore possible to counteract at least a part of the transverse elongation of the material 03 to be imprinted by means of employing an image regulator 38 (Fig. 1) wherein, prior to its entry into a following printing group 04, the material 03 to be imprinted is deformed, preferable in a wave shape, by the image regulator 38 transversely to its production direction R and in this way is reduced in its width B03 in a manner which counteracts the transverse elongation (Fig. 3). Preferably the intensity of the width reduction takes place at a reverse ratio in respect to the factor DQ of the transverse elongation, and can preferably also be changed in the course of the ongoing printing process. The deformation of the material 03 to be imprinted can take place, for example, mechanically by means of rollers which are preferably placed against it on both sides of the material 03 to be deformed wherein, for preventing negative effects on the quality, these rollers preferably act outside of the print image 11 on the material 03 to be imprinted and are preferably individually rotatorily driven. Another embodiment of the image regulator 38 provides at least one air nozzle directed onto the surface of the material 03 to be imprinted, which for example permits compressed air to flow against the material 03 to be imprinted and in this way deforms the material 03 to be imprinted in a contactless manner. Preferably several air nozzles are provided in connection with this pneumatic image regulator 38, which are spaced apart from each other, preferably at least three air nozzles, wherein the air flow of the air nozzle arranged between two air nozzles is preferably directed counter to the air flow of its adjoining air nozzles, so that the material 03 to be imprinted, which is charged with the air flow, is deformed in a wave shape. With the mechanical, as well as with the pneumatic

image regulator 38, the deformation of the material 03 to be imprinted can be preferably continuously controlled within defined limits by a control unit which controls the image regulator 38, in particular it can be remotely controlled from a control console which is part of the printing press 01. The control unit can change the center point SB of the print image 11 by actuating the image regulator 38.

List of Reference Symbols

01	Printing press, newspaper printing press, job-printing press
02	Printing unit
03	Material to be imprinted, web of material, paper web
04	Printing group
05	-
06	Ink-transferring cylinder, transfer cylinder
07	Cylinder, forme cylinder
08	Printing forme
09	Print image location
10	-
11	Print image
12	Shell face
13	Channel
14	Opening
15	-
16	End
17	End
18	Leg
19	Leg
20	-
21	Edge
22	Edge
23	Wall
24	Wall
25	-

26	End
27	Holding means
28	End
29	Groove
30	-
31	Counter-thrust element
32	Actuating means, hollow body, hose
33	Spring element
34	Guide element
35	-
36	Wall
37	Support element
38	Image regulator
B	Width (09)
L	Length (09)
M	Center line, reference marker
P	Production flow
R	Production direction
S	Center point (09)
T	Tangential line
V	Slit width
W	Distance
X	Axial direction, directional arrow
Y	Circumferential direction, directional arrow
SB	Center (11)
A1	Distance
A2	Distance

A3	Distance
B03	Width (03)
X1, Y1	Position
X2, Y2	Position
α	Opening angle
β	Opening angle